ABSTRACT OF THE DISCLOSURE

A method and apparatus for temperature-independent determination of a concentration of a probe gas in a sample over a selected temperature range between a low temperature T_L corresponding to a lowest temperature expected or found in the sample and a high temperature T_H corresponding to a highest temperature expected or found in the sample. In accordance with the method, a probe temperature function of the probe gas is determined over the temperature range using a first spectroscopic technique. Then, a second spectroscopic technique is selected, a reference gas is identified and a reference temperature function of the reference gas is determined using the second spectroscopic technique over the temperature range. In particular, the reference gas is identified such that a ratio of the probe temperature function and the reference temperature function is substantially constant over the temperature range. A probe reaction of the probe gas and a reference reaction of the reference gas is then measured by the first and second spectroscopic techniques and the concentration of the probe gas is derived from the probe reaction and reference reaction. The method of the invention can be take advantage of spectroscopic techniques such as absorption spectroscopy employing a test beam of light at several wavelengths with at least one wavelength for either probe transition or reference transition. The method and apparatus can be used in monitoring various gas samples and are especially well-suited for determining probe gas concentrations in samples which exhibit non-uniformities in temperature, pressure and gas composition, e.g., as encountered in vehicle exhaust samples.